

REMARKS

Claim 7 is proposed to be amended herein to correct a minor error in punctuation. No new matter has been added.

The Final Office Action mailed June 2, 2004, has been received and reviewed. Claims 1-20 are currently pending in the application. Claims 1-20 stand rejected. Applicant proposes to amend claim 7 and respectfully requests reconsideration of the application in light of the amendments and arguments presented herein.

Information Disclosure Statement(s)

Applicant notes the filing of an Information Disclosure Statement herein on December 1, 2003, and notes that no copy of the PTO/SB/08 was returned with the outstanding Office Action. Applicant respectfully requests that the information cited on the PTO/SB/08 be made of record herein.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on the Admitted Prior Art in View of U.S. Patent No. 3,699,210 to Binning *et al.* and U.S. Patent No. 3,573,086 to Lambdin, Jr.

Claims 1-6 and 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Admitted Prior Art in view of U.S. Patent No. 3,699,210 to Binning *et al.* ("Binning") and U.S. Patent No. 3,573,086 to Lambdin, Jr. ("Lambdin"). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a 35 U.S.C. § 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

The obviousness rejections of claims 1-6 and 13-15 are improper because the cited references do not provide a motivation to combine to produce the claimed invention.

To provide a motivation or suggestion to combine, the prior art or the knowledge of a person of ordinary skill in the art must “suggest the desirability of the combination” or provide “an objective reason to combine the teachings of the references.” M.P.E.P. § 2143.01. In addition, “it is fundamental that rejections under 35 U.S.C. § 103 must be based on evidence.” *In re Lee*, 61 U.S.P.Q.2d 1430, 277 F.3d 1338, 1342 (Fed. Cir. 2002). This evidence “must be based on objective evidence of record.” *Id.* at 1343. When patentability depends on a question of obviousness, “rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references” is “the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis.” *Id.* This rigorous showing requires the Examiner to “explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.” *Id.* In other words, the motivation to combine can not “be resolved on subjective belief and unknown authority.” *Id.* at 1344. Furthermore, the Examiner “cannot rely on conclusory statements when dealing with particular combinations of prior art and specific claims, but must set forth the rationale on which it relies.” *Id.* at 1345.

The Admitted Prior Art teaches a rocket motor insulation that uses a viscose rayon as a precursor material. The viscose rayon is impregnated with a resin matrix, manipulated into a desired configuration, and carbonized to form a carbon structure. See, the as-filed specification at paragraph [0003]. The Admitted Prior Art does not teach the fineness of the viscose rayon or using an aromatic polyamide as the precursor material.

Binning teaches a method of carbonizing fibers, such as aromatic polyamide fibers. Column 1, lines 5-9 and lines 32-68. The fibers are first pretreated by heating at a temperature of 180°C-550°C in an oxygen-containing environment for an amount of time sufficient to blacken the fibers. Column 1, lines 55-58. The blackened fibers are then heated in a laser beam in a non-oxidizing environment at a temperature from 700°C-1200°C for longer than one-tenth of a second to carbonize the fibers. Column 1, lines 58-61 and Column 3, lines 5-14. The carbon-based fibers are used in reinforced plastic composites, such as in ablative nose cones and rocket exhaust nozzles. Column 2, lines 1-5 and lines 37-41. The fibers are used with epoxy, phenolic,

silicone, polyimide, or other resin systems. Column 2, lines 37-41. In addition to aromatic polyamide fibers, Binning also teaches that rayon fibers are used. Column 3, lines 25-30. Binning does not teach the fineness of the fibers that are used.

Lambdin teaches an ablation-resistant structure having fibers of carbon or graphite that are bonded in a carbonized binder. Column 1, lines 14-16. The carbon or graphite fibers include cellulosic materials, such as rayon or cotton. Column 3, lines 25-27. Lambdin also teaches that rayon yarn having a denier of 2.29 is used to produce graphite fibers that are 10 mm in length and 5 mm in diameter. Column 3, lines 30-35. Lambdin does not teach or suggest that the fibers are formed from an aromatic polyamide.

As acknowledged by the Examiner, Binning does not teach the limitation in independent claim 1 of “providing a precursor material comprising at least one aromatic polyamide, the precursor material having a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber” because Binning does not teach or suggest the denier of the fibers. Office Action of June 2, 2004, p. 3. The Examiner also acknowledges that the Admitted Prior Art does not teach or suggest this limitation because the Admitted Prior Art does not teach using an aromatic polyamide. *Id.* at p. 2-3. The Examiner states that “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the rayon of the Admitted Prior Art with polyaramid since rayon is no longer available and since Binning et al. prefers polyaramid to rayon . . . and particularly since Binning et al. discloses such material can be used in the same type of environment as applicant’s.” *Id.* at p. 2.

However, the Examiner’s motivation to combine the Admitted Prior Art and Binning is improper because it is based on conclusory statements. The mere fact that rayon is no longer available does not provide the requisite motivation to combine because nothing in the cited references suggests the desirability of, or provides an objective reason for, replacing the viscose rayon of the Admitted Prior Art with the aromatic polyamide fibers of Binning. In addition, the fact that the aromatic polyamide fibers in Binning are preferred to rayon does not provide a motivation to replace the viscose rayon in the Admitted Prior Art with aromatic polyamide fibers to produce the claimed invention.

Furthermore, as acknowledged by the Examiner, even if the Admitted Prior Art and Binning were combined, the claimed invention would not be produced because the limitation of

the denier of the fibers would still not be taught or suggested. Office Action of June 2, 2004, p. 3. Therefore, the Examiner relies on Lambdin as teaching the denier of the fibers. *Id.* The Examiner states that “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to use 2.3 denier fiber to form the reinforcement since one in the art would use any conventional size fiber and Lambdin discloses this denier reinforcement has been used previously in carbonized impregnated fiber composites used in rocket nozzles.” *Id.* However, the section of Lambdin (column 1, lines 35-40) relied upon by the Examiner in support of this assertion does not teach using this denier reinforcement in carbonized impregnated fiber composites that are used in rocket nozzles. Rather, the cited section of Lambdin only teaches that “[h]igh-temperature applications such as space entry vehicles, rocket nozzles, combustion chamber liners, heat shields, etc., require structural materials which exhibit high strength, resistance to thermal shock, and good resistance to erosion by ablation.” Column 1, lines 35-40. Nothing in this cited section provides any teaching or suggestion for using a specific denier reinforcement in the carbonized impregnated fiber composites.

Furthermore, the reinforcement of Lambdin referred to by the Examiner is formed with a rayon material and is not formed from an aromatic polyamide material. As such, Lambdin only teaches using a rayon yarn having a denier of 2.29. Lambdin does not teach using aromatic polyamide fibers and, therefore, does not teach or suggest using aromatic polyamide fibers having this denier. In addition, Lambdin provides no teaching or suggestion to utilize a 2.3 denier fiber of other types of fibers, such as those used in the reinforced plastic composites of Binning or the carbon structure of the Admitted Prior Art.

The Examiner also refers to United States Patent No. 4,830,845 to Ogawa *et al.* (“Ogawa”) and United States Patent No. 3,635,675 to Ezekiel (“Ezekiel”) as “show[ing] by a preponderance of the evidence using fiber sizes of 1.5-3 denier for carbonized fibers for use in ablative materials.” *Id.* at p. 10. Applicant notes that the pending claims have not been rejected over either of these two references. Furthermore, Ogawa is directed toward an acrylic fiber precursor having a fineness of 0.1 to 2.0 deniers while Ezekiel is directed toward a graphite fiber having a fineness of 1.2-2.1 deniers. Neither of these references teaches or suggests using an aromatic polyamide and, therefore, the references necessarily do not teach or suggest using an

aromatic polyamide having the recited denier per fiber. As such, these references do not cure the deficiencies in the Admitted Prior Art, Binning, and Lambdin.

Since the Admitted Prior Art does not teach using an aromatic polyamide, the Admitted Prior Art necessarily does not suggest that the aromatic polyamide has the recited denier per fiber. While Binning teaches using an aromatic polyamide, Binning does not suggest that the aromatic polyamide has a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber. Finally, while Lambdin teaches a rayon yarn having the recited denier per fiber, Lambdin does not suggest using an aromatic polyamide and, therefore, necessarily does not suggest the recited denier per fiber of the aromatic polyamide.

Since the cited references do not provide a motivation to combine to produce the claimed invention, the obviousness rejection of claim 1 is improper and should be withdrawn.

Claims 2-6 and 13-15 are allowable, *inter alia*, as depending from allowable claim 1.

Obviousness Rejection Based on the Admitted Prior Art, Binning, and Lambdin, Jr., and Further in View of U.S. Patent No. 3,576,769 to Hirsch *et al.*

Claims 7-12 and 16-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Admitted Prior Art, Binning, and Lambdin, as applied to claim 1 above, and further in view of U.S. Patent No. 3,576,769 to Hirsch *et al.* ("Hirsch"). Applicant notes that the Examiner's rejections described in Points 3 and 5 of the outstanding Office Action appear to be the same. Office Action of June 2, 2004, p. 4-5 and p. 7-8. As such, the rejections described in Points 3 and 5 are addressed together herein. Applicant respectfully traverses this rejection, as hereinafter set forth.

The obviousness rejections of claims 7-12 and 16-20 are improper because the cited references do not provide a motivation to combine to produce the claimed invention.

The teachings of the Admitted Prior Art, Binning, and Lambdin are as previously summarized.

Hirsch teaches a method of semicarbonizing an aromatic polyamide by exposing the aromatic polyamide to a moderate temperature over an extended time period. Column 2, lines 13-24. The aromatic polyamide is poly-m-phenylenebis(m-aminobenzamido)terphthalamide, the polyterephthalamide of 4, 4'-bis(4-aminobenzamido)diphenyl ether, poly-m-phenylene

isophthalamide, poly-m-phenylenebis(m-aminobenzamido)-2,6-naphthylene dicarbonamide, poly-4,4'-diaminobenzanilide terephthalamide. Column 3, lines 6-13. To semicarbonize the aromatic polyamide, the temperature is slowly raised from 25°C to 250°C or 500°C over a time period of 45-60 minutes. Column 2, lines 29-36. Hirsch teaches that exposing the aromatic polyamide to higher temperatures, such as temperatures required to carbonize the aromatic polyamide, causes products including the aromatic polyamide to become embrittled and weak. Column 2, lines 27-29. The products obtained by the method of Hirsch include semicarbonized aromatic polyamides and the properties of these products are distinguished from the properties of products produced by a carbonizing process. Column 2, lines 1-9.

As acknowledged by the Examiner, the Admitted Prior Art, Binning, and Lambdin do not teach the limitation in independent claim 7 of "providing a precursor material comprising at least one poly(meta-arylaramid), the precursor material having a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber" because these references do not teach using a poly(meta-arylaramid). Office Action of June 2, 2004, p. 7. Therefore, the Examiner relies on Hirsch as teaching the use of the poly(meta-arylaramid). *Id.* at p. 4. The Examiner states that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to use any type of polyaramid such as NOMEX as the polyaramid in the Admitted Prior Art, Binning et al., and Lambdin, Jr. since Binning et al. discloses using polyaramids having phenylene which are not ortho and which have hydrogens as the pendant groups, and since Hirsch et al. shows that NOMEX is known in the art as a heat-resistant material (Abstract) and as a heat shield." *Id.*

However, nothing in the cited references, when combined, provides a motivation to combine to produce the claimed invention because the cited references do not suggest the desirability of, or provide an objective reason for, the combination. As previously discussed, the Admitted Prior Art does not teach using an aromatic polyaramide and, therefore, does not teach using a poly(meta-arylaramid) or using a poly(meta-arylaramid) having the recited denier per fiber of the poly(meta-arylaramid). While Binning teaches using an aromatic polyamide, it does not teach or suggest that the aromatic polyamide is a poly(meta-arylaramid) having a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber. In addition, merely because Binning teaches using phenylenes that are not ortho does not render it obvious to use any polyaramid in the claimed invention. Furthermore, while Binning teaches using phenylenes that

are not ortho, Binning provides no specific suggestion that a poly(meta-arylaramid) should be used and, therefore, provides no motivation to use a poly(meta-arylaramid). Since Lambdin only teaches that its carbon or graphite fibers are rayon or cotton, Lambdin also does not teach using a poly(meta-arylaramid) as the precursor material. Therefore, Lambdin necessarily does not teach or suggest using the recited denier per fiber of the poly(meta-arylaramid). Finally, while Hirsch teaches using a poly(meta-arylaramid), Hirsch does not suggest that the poly(meta-arylaramid) has a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber. As such, Hirsch does not cure the previously discussed deficiencies in the Admitted Prior Art, Binning, and Lambdin.

Hirsch also teaches away from combination with the Admitted Prior Art, Binning, and Lambdin because Hirsch teaches semicarbonizing (partially carbonizing) aromatic polyamide fibers to produce aromatic polyamide fibers that are non-flammable, thermally stable, chemically inert, and exhibit good dimensional stability at elevated temperatures. In contrast, the Admitted Prior Art, Binning, and Lambdin teach carbonizing their respective fibers. Hirsch also states that if the aromatic polyamide fibers are carbonized, rather than being semicarbonized, the aromatic polyamide fibers become weak and embrittled. Column 2, lines 27-29. Since the teachings of Hirsch relate to semicarbonizing the aromatic polyamide fibers and teach that carbonizing the aromatic polyamide fibers is undesirable, one of ordinary skill in the art would not be motivated to combine the cited references to produce the claimed invention.

Since the cited references do not provide a motivation to combine to produce the claimed invention, the obviousness rejection of claim 7 is improper and should be withdrawn.

Claims 8-12 and 16-20 are allowable, *inter alia*, as depending from an allowable base claim.

Obviousness Rejection Based on Binning in View of the Admitted Prior Art and Lambdin

Claims 1-7 and 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Binning in view of the Admitted Prior Art and Lambdin. Applicant notes that the Examiner's rejections described in Points 2 and 4 of the outstanding Office Action are substantially similar, except for the inclusion of claim 7 in the rejection described in Point 4. Office Action of June 2, 2004, p. 2-3 and p. 5-7. Since the rejection of claims 1-6 and 13-15 over the Admitted Prior Art,

Binning, and Lambdin has been previously addressed on p. 5-8 of the instant response, only the rejection of claim 7 is addressed in this section. Applicant respectfully traverses this rejection, as hereinafter set forth.

The obviousness rejection of 7 is improper because the cited references do not teach or suggest all of the claim limitations and do not provide a motivation to combine to produce the claimed invention.

The Admitted Prior Art, Binning, and Lambdin do not teach or suggest all of the limitations of claim 7 because the cited references do not teach or suggest the limitation of “providing a precursor material comprising at least one poly(meta-arylaramid), the precursor material having a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber.” As acknowledged by the Examiner, none of these references teaches using a poly(meta-arylaramid). *Id.* at p. 7. The Admitted Prior Art does not teach using an aromatic polyaramide and, therefore, necessarily does not teach or suggest using a poly(meta-arylaramid) or using a poly(meta-arylaramid) having the recited denier per fiber of the poly(meta-arylaramid). While Binning teaches using an aromatic polyamide, Binning does not teach or suggest that the aromatic polyamide is a poly(meta-arylaramid) having a denier per fiber ranging from 1.5 denier per fiber to 3.0 denier per fiber. In addition, contrary to the Examiner’s assertions, merely because Binning teaches using phenylenes that are not ortho does not render it obvious to use any polyaramid in the claimed invention. Furthermore, while Binning teaches using phenylenes that are not ortho, Binning provides no specific suggestion that a poly(meta-arylaramid) should be used. Lambdin also does not teach using a poly(meta-arylaramid) as the precursor material because Lambdin only teaches that its carbon or graphite fibers are rayon or cotton. Therefore, Lambdin necessarily also does not teach or suggest the recited denier per fiber of the poly(meta-arylaramid).

Furthermore, even if the cited references were combined, the claimed invention would not be produced. Even assuming *arguendo* that the motivation proposed by the Examiner is correct, since none of the Admitted Prior Art, Binning, or Lambdin teach or suggest using a poly(meta-arylaramid) as the precursor material, the claimed invention would not be produced upon combination of these references because the precursor material would not comprise at least one poly(meta-arylaramid).

Since the cited references do not teach or suggest all the limitations and do not provide a motivation to combine to produce the claimed invention, the obviousness rejection of claim 7 is improper and should be withdrawn.

Obviousness Rejection Based on Binning, the Admitted Prior Art, and Lambdin, and Further in View of Hirsch

Claims 7-12 and 16-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Binning, the Admitted Prior Art, and Lambdin, as applied to claim 1 above, and further in view of Hirsch. As previously described, the rejections detailed in the Examiner's Points 3 and 5 of the outstanding Office Action appear to be substantially identical. The rejections over these cited references were addressed on p. 8-9 of the instant response.

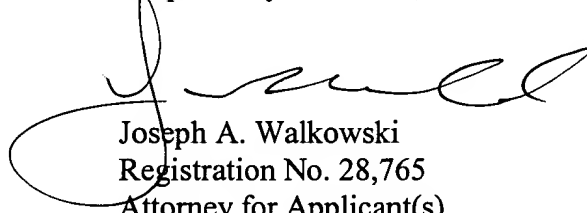
ENTRY OF AMENDMENTS

The proposed amendment to claim 7 above should be entered by the Examiner because the amendment is supported by the as-filed specification and drawings and does not add new matter to the application. Further, the amendment does not raise new issues or require a further search. Finally, if the Examiner determines that the amendment does not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 1-20 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, she is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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